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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/587,195	04/30/2007	**Euan Smith**	29610/CDT337	8447

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EXAMINER	
BOWMAN, MARY ELLEN	
ART UNIT	**PAPER NUMBER**
2879	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/587,195	SMITH ET AL.	
	Examiner	Art Unit	
	MARY ELLEN BOWMAN	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 May 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed May 3, 2010 have been fully considered but they are not persuasive. Applicant's initial argument, that Aziz (US 2003/0234609) fails to teach an optical interference structure, is not persuasive. Aziz teaches an optical interference structure utilized for the purpose of decreasing ambient light reflection (see [0104 and 0225]). Applicant's second argument that Bechtel (WO 2004/004421) teaches away from the structure set forth in Aziz is also not persuasive. Bechtel's teaching regarding the advantages of a certain manufacturing process do not teach away from the use of different components, such as an electron injection layer. Bechtel is simply silent regarding said structural limitations. Bechtel does teach, however, an optical interference structure configured to both enhance light transmission through the cathode (as claimed) and to reduce ambient light reflection (similar to the optical interference structure taught by Aziz). Therefore, because each reference solves a similar problem of reducing ambient light reflection, it would have been obvious to combine the references. The rejection as set forth below is maintained and made final.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 6-12, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aziz et al., USP App. Pub. No. 2003/0234609 A1, published December 25, 2003

(hereinafter referred to as "Aziz") in view of Bechtel, et al., WO 2004/004421 A2, published January 8, 2004 (hereinafter referred to as "Bechtel").

Regarding claims 1, 2, 6 and 10, Aziz teaches **an organic light emitting diode (OLED) comprising a substrate bearing a light emitting layer between an electrically conducting anode and an electrically conducting cathode** ([0105]), **the diode being configured for light emission through said cathode, the cathode being transmissive at a light emission wavelength of the diode** ([0211]), **and the cathode comprising an electron injecting layer for injecting electrons into said light emitting layer, an optical interference structure, and an electrically conducting layer, said electron injecting layer being closest to the light emitting layer and said optical interference structure being disposed between said electron injecting and electrically conducting layers** (e.g., [0225]; "capping region (2056) (i.e., third layer)/MOML2 (2054B)/MOML1 (2054A) (i.e., optical interference layer)/charge injection region (2052) (i.e., electron injection region)" and [0211]; "a capping region can be composed of…metal compounds such as…ITO, ZnO (i.e., an electrically conducting layer)"). Aziz fails to teach the specific structure of the optical interference layer.

In the same field of endeavor of OLEDs, Bechtel teaches **said optical interference structure comprises a dielectric material** (e.g., p. 7, lines 12-13; "three transparent, dielectric layers 5 (i.e., optical interference layers) were deposited on the second electrode 4 (i.e., the cathode)") **and is configured to enhance light transmission through said cathode at said emission wavelength** (e.g., p. 2, lines 15-17; "dielectric layer bordering on the second electrode (i.e., the cathode) has a high refractive index n…and more light passes through the second electrode"), **wherein said emission wavelength is substantially equal to a peak or center**

emission wavelength of said light emitting layer (e.g., p. 6, lines 1-3; "the transmission curve is adapted to the emission spectrum of the light generated, such that the transmission maximum (i.e., the peak) of the electrode lies in the range of the emission maximum of PPV"). Bechtel further teaches **said optical interference layer lying between first and third layers of different refractive indices such that reflections from front and back surfaces of said optical interference layer interface to enhance light transmission through said cathode at said emission wavelength** (e.g., p. 2, lines 11-14; "a second electrode (i.e. a cathode) and 2n+1 transparent dielectric layers (i.e., 3 of them), where n=0, 1, 2, 3...α, the transparent dielectric layers alternately have a high refractive index...and a low refractive index").

It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize the optical interference structure taught by Bechtel in the multilayer cathode taught by Aziz, because the optical interference structure of Bechtel provides the added benefit of enhancing light transmission through the cathode, as well as decreasing ambient light reflection similar to the optical interference layer taught by Aziz.

Regarding claim 3, Aziz and Bechtel teach the invention as explained above regarding claim 2, and Aziz further teaches **said first layer comprises the electron injecting layer for injecting electrons into said light emitting layer, and wherein said third layer comprises the electrically conducting layer** (e.g., [0225]; "capping region (2056) (i.e., third layer)/MOML2 (2054B)/MOML1 (2054A) (i.e., optical interference layer)/charge injection region (2052) (i.e., electron injection region)" and [0211]; "a capping region can be composed of…metal compounds such as…ITO, ZnO (i.e., an electrically conducting layer)").

Regarding claim 7, Aziz and Bechtel teach the invention as explained above regarding claim 2, and Aziz further teaches **said third layer comprises a metal layer** (e.g., [0211]; "a capping region can be composed of…metal compounds such as…ITO, ZnO (i.e., an electrically conducting layer)").

Regarding claim 8, Aziz and Bechtel teach the invention as explained above regarding claim 2, and Aziz further teaches **said optical interference layer comprises a wide bandgap semiconductor** (e.g., [0242]; "the inorganic metal compounds for the MOML (i.e., the optical interference layer) may be a ...metal nitride...the metal nitride can be, but is not limited to...GaN (i.e., a wide bandgap semiconductor)").

Regarding claim 9, Aziz and Bechtel teach the invention as explained above regarding claim 2, and Aziz further teaches **said optical interference layer comprises a transparent conductor** (e.g., [0242]; "the inorganic metal compounds for the MOML (i.e., the optical interference layer) may be a…metal oxide…the metal oxides can be, but are not limited to…ZnO, ITO (i.e., a transparent conductor)").

Regarding claim 11, Aziz and Bechtel teach the invention as explained above regarding claim 2, and Aziz further teaches **said electron injecting layer includes a layer of a metal** (e.g., [0149]; "the metal-organic mixed layer in embodiments can function as the electron injection contact").

Regarding claim 12, Aziz and Bechtel teach the invention as explained above regarding claim 1, and Aziz further teaches **said OLED is included in a display device** (abstract).

Regarding claim 15, Aziz and Bechtel teach the invention as explained above regarding claim 8, and Aziz further teaches **said wide bandgap semiconductor comprises zinc selenide**

or gallium nitride (e.g., [0242]; "the inorganic metal compounds for the MOML (i.e., the optical interference layer) may be a ...metal nitride...the metal nitride can be, but is not limited to...GaN (i.e., a wide bandgap semiconductor)").

Regarding claim 16, Aziz and Bechtel teach the invention as explained above regarding claim 9, and Aziz further teaches **said transparent conductor comprises indium tin oxide or indium zinc oxide** (e.g., [0242]; "the inorganic metal compounds for the MOML (i.e., the optical interference layer) may be a…metal oxide…the metal oxides can be, but are not limited to…ZnO, ITO (i.e., a transparent conductor)").

Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aziz in view of Bechtel and further in view of Hofstra et al., USP App. Pub. No. 2003/0127971 A1, published July 10, 2003 (hereinafter referred to as "Hofstra").

Regarding claims 4 and 5, Aziz and Bechtel teach the invention as explained above regarding claim 2, but fail to teach a thickness of the optical interference layer.

In the same field of endeavor of display devices utilizing optical interference structures, Hofstra teaches **said optical interference layer has an optical thickness of substantially a quarter of said emission wavelength** ([0065]; "optical interference member 16'…having a thickness of about seven-hundred-and-forty-five angstroms…so that it behaves as a quarter-wave-stack at a light wavelength of five-hundred-and-fifty nanometers (550nm)").

It would have been obvious to one of ordinary skill in the art at the time the invention was made to create an optical interference layer having a thickness of a quarter wavelength of the emitted light from the display to create interference resulting in increased light emission from the

display and decreased ambient light reflection, which improves display quality (Hofstra, abstract).

Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aziz in view of Hofstra.

Regarding claim 13, Aziz teaches **an organic light emitting diode (OLED)-based display device including one or more OLEDs each comprising a layer of OLED material sandwiched between anode and cathode electrode layers, said OLED material electroluminescing when a current is passed between said anode and cathode electrode layers** ([0105])**, a first of said electrode layers being at least partially transmissive at a peak wavelength of said electroluminescence and being closer to a display surface of said device than the second of said electrode layers whereby the device is configured for electroluminescent display through said first electrode layer** ([0211]; "a capping region can be composed of…metal compounds such as…ITO, ZnO (i.e., an electrically conducting layer)"; Note: The cathode is transmissive to light emitted from the OLED, including the peak wavelength of light emitted)**, wherein said first electrode layer comprises a spacer layer sandwiched between a coupling layer for connecting to said OLED material and a third, substantially electrically conductive layer** (e.g., [0225]; "capping region (2056) (i.e., third layer)/MOML2 (2054B)/MOML1 (2054A) (i.e., spacer layer)/charge injection region (2052) (i.e., electron injection region, coupling layer)"). Aziz fails to teach the thickness of the spacer layer.

In the same field of endeavor of OLEDs, Hofstra teaches an optical interference structure having **a thickness of approximately an odd integral number of quarter wavelengths at said peak**

electroluminescence wavelength (e.g., [0065]; "optical interference member 16'…having a thickness of about seven-hundred-and-forty-five angstroms…so that it behaves as a quarter-wave-stack at a light wavelength of five-hundred-and-fifty nanometers (550 nm)"; Note: One quarter wavelength is an odd integral number of quarter wavelengths) **such that transmission through said first electrode layer at said peak electroluminescence wavelength is substantially maximized** (e.g., [0065]; "chosen so that the transmission through [the transparent electrode] is greater than about eighty percent, and preferably at least about ninety percent").

It would have been obvious to one of ordinary skill in the art at the time the invention was made to create an optical interference layer having a thickness of a quarter wavelength of the emitted light from the display to create interference resulting in increased light emission from the display and decreased ambient light reflection, which improves display quality (Hofstra, abstract).

Regarding claim 14, Aziz and Hofstra teach the invention as explained above regarding claim 13, and Aziz further teaches **said first electrode layer is said cathode electrode layer** (cathode layer 150, comprising layers 160, 170 and 180).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARY ELLEN BOWMAN whose telephone number is (571) 270-5383. The examiner can normally be reached on Monday-Thursday, 8:00 a.m.-6:30 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. B./
Examiner, Art Unit 2879

/NIMESHKUMAR D. PATEL/
Supervisory Patent Examiner, Art Unit 2879